



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

10/538,127

01/30/2006

Hirokatsu Miyata

03500.017773.

2258

5514 7590 06/08/2009  
FITZPATRICK CELLA HARPER & SCINTO  
30 ROCKEFELLER PLAZA  
NEW YORK, NY 10112

EXAMINER

XU, LING X

ART UNIT

PAPER NUMBER

1794

MAIL DATE

DELIVERY MODE

06/08/2009

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/538,127	<b>Applicant(s)</b> MIYATA ET AL.	
	<b>Examiner</b> Ling Xu	<b>Art Unit</b> 1794	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 14 April 2009.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) 15-20 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-14 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 06 June 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)            | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | Paper No(s)/Mail Date. _____                                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>6/6/2005 and 11/8/2005</u> .                                  | 6) <input type="checkbox"/> Other: _____                          |

## **DETAILED ACTION**

### ***Election/Restrictions***

1. Applicant's election without traverse of Group I, claims 1-14, in the reply filed on 4/14/2009 is acknowledged. Claims 15-20 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim.

### ***Claim Objections***

2. Claim 13 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form.

Claim 1 is a product-by-process claim. It appears that the claimed columnar structured material is a final product made by the process described in the claims. The claimed columnar structured material is formed after the removal of the columnar substances. Accordingly, the columnar substances are not part of the claimed columnar structured material or the claimed columnar structure does not comprise the columnar substances. It is unclear, however, if the claimed columnar structured material comprises the matrix member.

If the claimed columnar structured material recited in claim 1 comprises the matrix member, the recitation "the matrix member is removed from the columnar

Art Unit: 1794

structured material" recited in claim 13 fails to further limit the subject matter of claim 1 because the claimed columnar structure material recited in claim 13 does not comprise the matrix member. The scope of the claim 13 is broader than the scope of claim 1.

If the claimed columnar structured material recited in claim 1 does not comprise the matrix member, the recitation that "the matrix member is removed from the columnar structured material" recited in claim 13 would still fail to further limit the subject matter of claim 1 because the scope of the claim 13 is the same as that of claim 1.

### ***Claim Rejections - 35 USC § 112***

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1-14 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 1-14 are product-by-process claims. It appears that the claimed columnar structured material is a final product made by the process described in the claims. The claimed columnar structured material is formed after the removal of the columnar substances. Accordingly, the columnar substances are not part of the claimed columnar structured material or the claimed columnar structure does not comprise the columnar substances. It is unclear, however, if the claimed columnar structured material comprises the matrix member.

Also in claim 1, since the claim does not identify the first component and the second component, it is unclear how to identify a second component which is capable of forming a eutectic with the first component.

In claim 5, it is unclear if the aluminum is the first component recited in claim 1 and the silicon is the second component recited in claim 1.

In claim 6, it is unclear if the aluminum is the first component recited in claim 1 and the Germanium is the second component recited in claim 1.

### ***Double Patenting***

4. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

Claims 1-14 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-13 of

Art Unit: 1794

copending Application No. 10/537,161. Although the conflicting claims are not identical, they are not patentably distinct from each other because claims 1-13 in the copending application discloses a thermoelectric conversion material having a multi-column structure comprising a porous body having columnar pores and a semiconductor material introduced into the pores of the porous body, characterized in that the porous body is formed by removing a column-forming material containing a first component from a structure in which a plurality of columns of the column-forming material are distributed in a matrix containing a second component that is eutectic with the first component.

Claims 1-13 of the copending application also recite that the first component is aluminum; the second component is silicon or germanium; and the structure contains silicon or germanium at 20 atomic% or more and 70 atomic% or less. The average spacing of columns in the structure is 5 nm or more and 20 nm or less and part of the column-forming material is a crystalline material, and the matrix is an amorphous material.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

### ***Claim Rejections - 35 USC § 102***

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

Art Unit: 1794

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-5, 7, and 9-14 are rejected under 35 U.S.C. 102(b) as being anticipated by Ying et al. (US 6,359,288).

Regarding claims 1-4 and 11-12, Ying discloses an array of nanowires comprising a substrate 12 having a plurality of columnar holes (col. 8, lines 45-60). Each of the holes is filled with a semiconductor material 15 (filler). The substrate has a thin film form with a thickness T1 of 200nm to fifty microns (col. 9, lines 1-10). The substrate may be provided as an anodic aluminum oxide film, which is considered as an amorphous substance.

As stated above, claims 1-4 are product-by-process claims. It appears that the claimed columnar structured material is a final product made by the process described in the claims. The claimed columnar structured material is formed after the removal of the columnar substances. Accordingly, the columnar substances comprising the first component are not part of the claimed columnar structured material or the claimed columnar structure does not comprise the columnar substances.

It should also be noted that, for product-by-process claims, even though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process.” In re Thorpe, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985). In this case, since Ying discloses the same

Art Unit: 1794

product as claimed, Ying anticipates the claimed product limitations even through the product disclosed by Ying may be made by a different process.

With respect to the property that the second component capable of forming a eutectic with the first component. Since claim 1 does not identify the first component and the second component, the first component can be any material. As stated above, Ying discloses that the same columnar structured material comprising the same matrix member, the same matrix member would also have the same properties including the capability of forming a eutectic with certain materials.

Regarding claims 5 and 7, Ying discloses that the substrate 12 may be provided from mesoporous silica (col. 9, lines 10-25). Silica contains between 20 and 70 atomic percent silicon.

Regarding claims 9-10, Ying discloses that the average pore diameter in the range of about 1-50nm (col. 10, lines 40-50), which overlaps the range recited in claim 9. The interval between the nanowire regions is the difference between the cell size and the pore diameter (see Fig. 2). The cell size can be calculated by a formula  $C=mV$  (col. 12, lines 1-25).  $V$  can be in the range of about 5-30 and  $m$  can be 2.5.

When  $V$  is 5, the cell size is about 13 nm ( $C=2.5 \times 5 = 12.5$ ). The difference between the cell size and the pore diameter is 12nm (pore diameter is 1).

When  $V$  is 30, the cell size is 75 nm ( $C=2.5 \times 30 = 75\text{nm}$ ). The difference between the cell size and the pore diameter is 25nm (pore diameter is 50).

Accordingly, Ying discloses that the interval between the pores can be in the range of 12-25nm, which overlaps the range as recited in claim 10.



Regarding claim 13, Ying discloses that a very thin layer (conductor) was found to coat the topside surface of the porous substrate film to serve as an electric contact for the Bi nanowires (col. 18, lines 10-15).

Regarding claim 14, Ying discloses that the matrix can be dissolved to expose the Bi nanowires (col. 18, lines 23-30).

### ***Claim Rejections - 35 USC § 103***

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 6 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ying et al., as applied to claim 1 above, and further in view of Harmer et al. (US 5,824,622).

As stated above, Ying discloses the same columnar structured material as recited in claim 1.

Ying discloses that the substrate 12 ("matrix member") may be provided from mesoporous silica. Silica contains between 20 and 70 atomic percent silicon (col. 9, lines 10-25). Ying does not specify that the matrix member comprising germanium as recited in claims 6 and 8.

However, it is known in the art that germania and silica are art recognized equivalents. For example, Harmer teaches that metal oxides such as alumina, silica,

Art Unit: 1794

and germania are suitable material for forming the mesoporous structure (col. 3, lines 15-20). Like silica, germania also contains between 20 and 70 atomic percent germanium.

It would have been obvious to one of ordinary skill in the art at the time of the invention to substitute silica with germania in Ying because germania is similar in structure to silica and is an art recognized equivalent to silica. Substitution of one known element (silica) for another (Germania) to yield predictable results would be obvious to one skilled in the art, *KSR International Co. v. Teleflex Inc.*, 82 USPQ2d 1385 (U.S. 2007).

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ling Xu whose telephone number is 571-272-7414. The examiner can normally be reached on 8:00 am- 4:30 pm, Monday - Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jennifer McNeil can be reached on 571-272-1540. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 1794

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Ling Xu  
Primary Examiner  
Art Unit 1794

/Ling Xu/  
Primary Examiner, Art Unit 1794

Lx  
June 4, 2009